



# Distributed Operations



Office of Force Transformation

*The small...*

*The fast...*

*Distributed Adaptive Operations:*

*Command & Control of  
Networked-enabled forces,  
geographically dispersed*

*and the many....*

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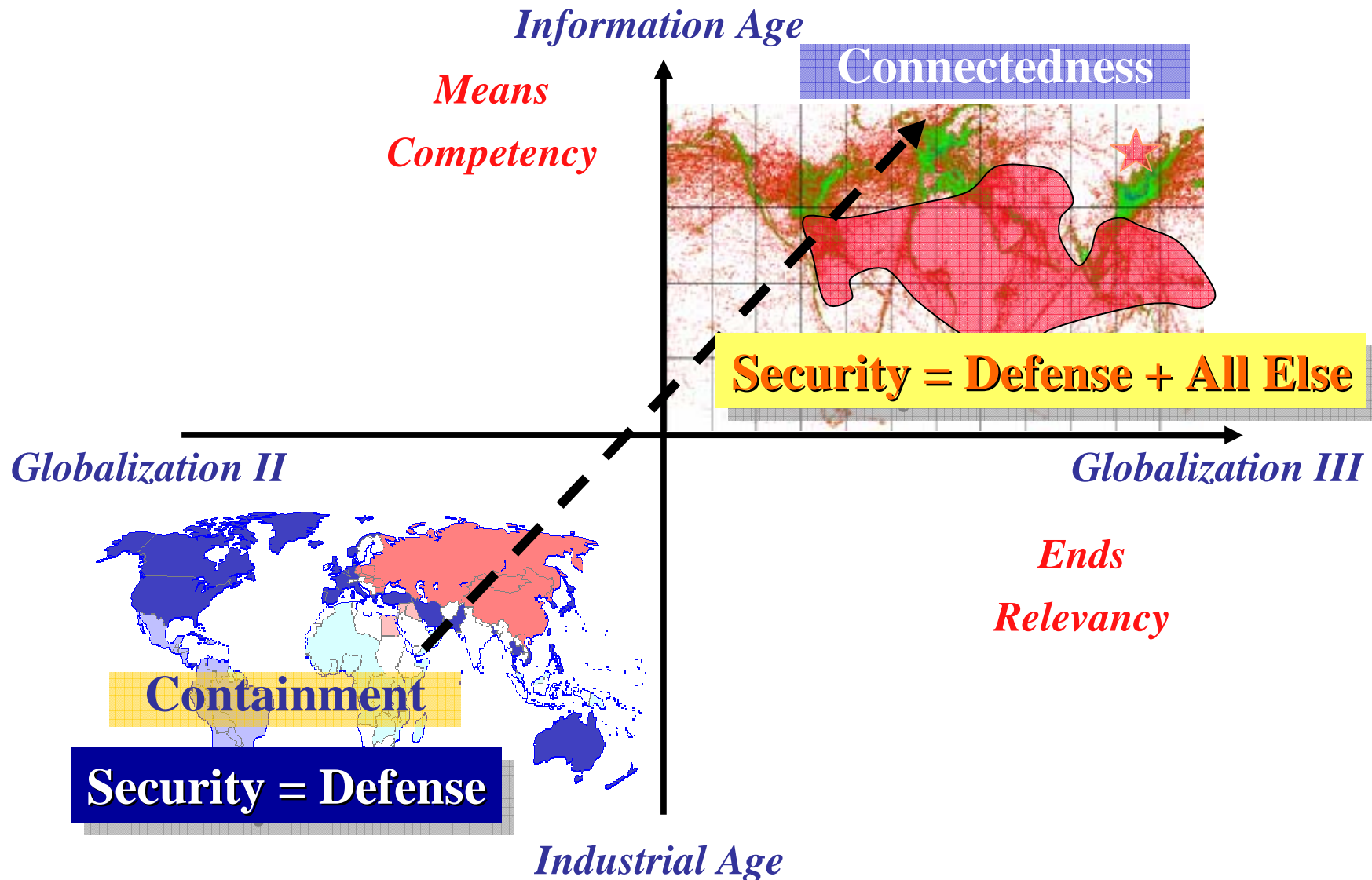


# Transformation

...Meeting the Challenges of the New Competitive Landscape



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# Shifting Security Environment

## *Competing in the “Contested Zones”*



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- *More Complex contingencies, More competitors & Broader mission range*
  - Mixing humanitarian, peacemaking and high intensity combat against...
  - Highly networked societies, hiding in plain sight, and retreating into a...
  - **“Three Block War”** – *a complex distributed adaptive operation*
- *Greater need to deter forward, respond rapidly and operate **dispersed***
  - To defeat or avoid anti-access / ambiguous threats requires a...
  - New employment posture, ability to operate interdependently and have the...
  - Capacity to self-organize and rapidly build coalitions
  - *In order to...**Compete in the “Contested Zones” of the littorals & urban areas***

***Complexity, Adaptability and Transaction Rates Matter***



# Information age competition

## *...Characteristics of the environment*



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- Fog and friction will always be present...
  - *Competition continuously increases complexity...in order to survive and win*
- Solving for complexity requires...
  - *Getting a solution quickly rather than...*
    - identifying a perfect solution over time then executing as fast as possible
- Increased importance on ***collaboration*** and ***cooperation***
  - *Networking has greater value than individual performance*
  - *Reach dominates Richness*
- Increased need for higher transaction rates and high rates of learning
  - *Diversity, variety, scale, and numbers matter*
  - *Iteration and continuous feedback is required*

***Rapid adaptation = co-evolution in an increasingly complex environment***



# On the Front Line

*...more SOF like*



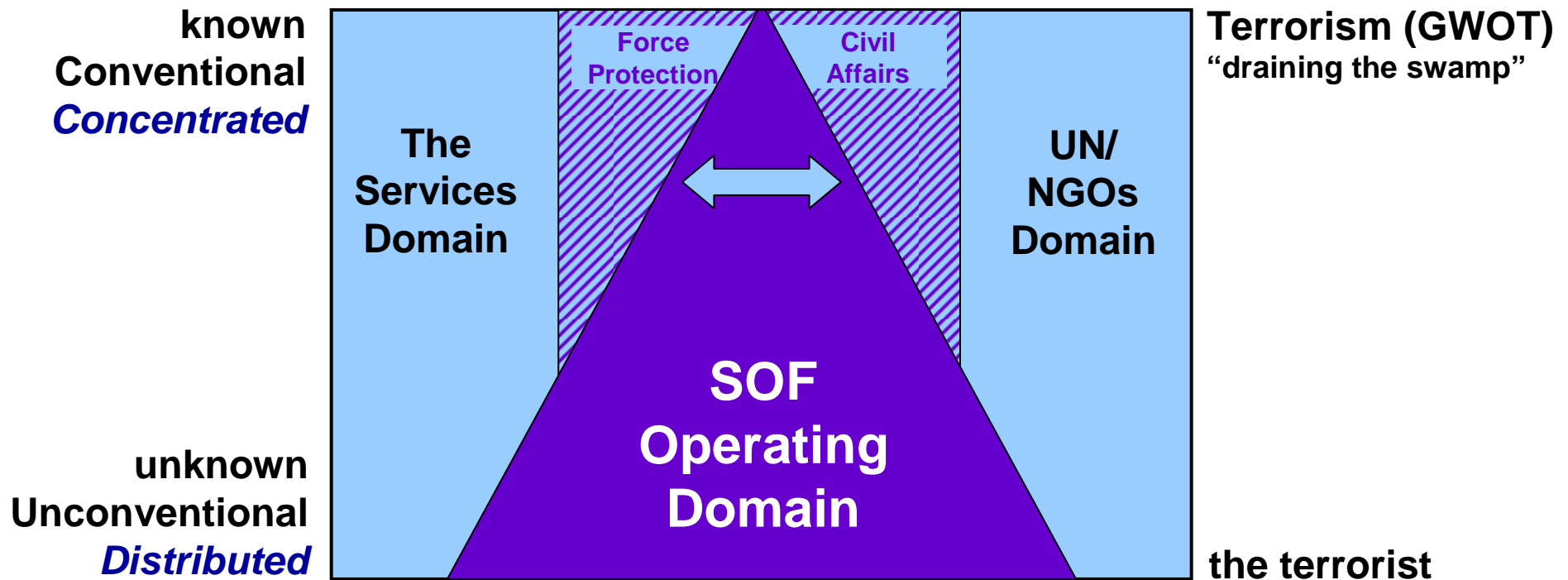
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- Wrong assumptions
- Slow bureaucracy
- Low probability event



Capability Vacuum  
Gets Filled by SOF



***If the services cannot rapidly adapt, SOF becomes over-utilized, conventionalized, distracted, stagnant and demoralized***





# New Basis for Competition

*...networked forces outfight non-networked forces*



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- *Distributed Adaptive Operations*

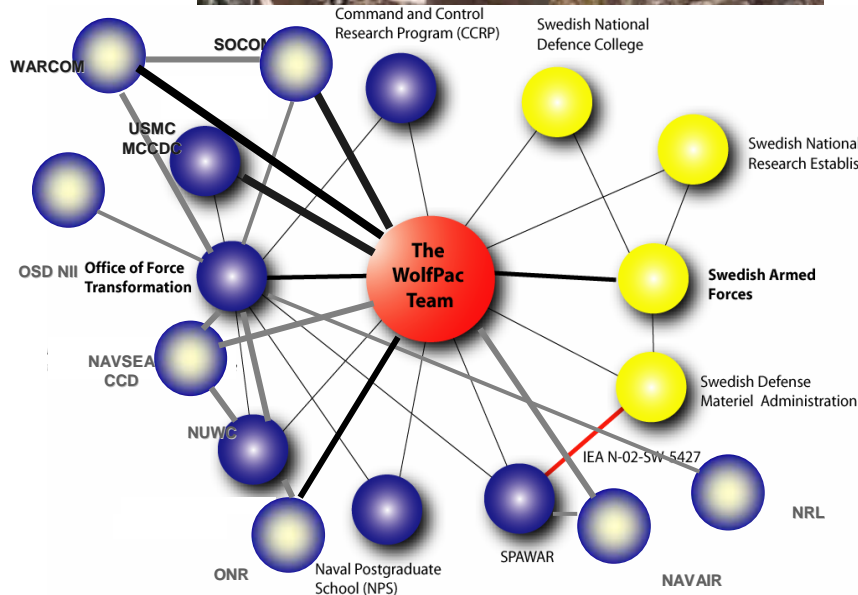
- Mass effects without massing forces
- Influence actions broadly
- Catalyze networked effects
- Create high transaction rates
- Self-organize decision making

- *Defined by simple rule sets*

- Generate “organic intelligence”

- *and exploit Global intelligence*

- Adapt rapidly to dynamic conditions
- Execute distributed or concentrated ops
- Create overmatching complexity





# Assuring U.S. Security

## *...OFT's Objectives*



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### ➤ **U.S. Security is not assured by protecting only our Nation's borders.**

- *The U.S. must have access to remote but populous regions of the globe to guarantee our freedom.*

*Secure strategic access and retain global freedom of action.*

*Donald H. Rumsfeld, National Defense Strategy, 01 March 2005*

- 1. That security requires development of smaller, faster, scale relevant, more adaptive vessels for highly effective engagement of an allusive adversary.*
- 2. Making these systems work will require a whole new technological and operational Command and Control approach to warfare.*
- 3. Most importantly, To develop these new, reconfigurable vessels and forces requires an industrial base able to produce them.*



# ***Stiletto***



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*The small...*

*The fast...*

*and the many....*





# Assured Access to the Littoral

## *Operational Maneuver from the Sea*



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- ***Operational and Employment Capabilities for Sea Basing***
  - Dedicated to Special Operations *for...*
    - *Mobility – High Speed / high payload fraction / low draft-wake*
    - *Force Insertion – In close engagement, greater speed of maneuver*
    - *Force Sustainment – Organic supply, local control, relevant scale*
  - But can be reconfigured for changing roles and dynamic conditions
    - *Disaster Relief / Humanitarian Assistance?*
  - To create a strategic approach to cost for DoD...
    - *and cost imposing strategy on adversaries*



# Wolf PAC

## *Distributed Adaptive Operations*



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- ***Operational experiment for Distributed Operations.***
  - Command & Control of networked-enabled forces, geographically dispersed
  - Coordinate with Coherence large numbers of autonomous & semi-autonomous assets and Heterogeneous Sensors
  - Collaborative & co-evolutionary initiative to leverage the contributions of many for coherent national purpose
- ***High numbers of fast, modular, smaller scale surrogates***
  - High numbers of co-evolutionary cycles
- ***Total system approach***
  - Architectural relationships – *rules for how things fit together*

*Provide a venue to develop operational experience with  
**Distributed Operations***



# Increase Learning Rates

*Concept to Operational Capability in 18 months*



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- *Experiment w/ new materials & hull forms to broaden seaborne capabilities*
  - Reduce crew injury
    - *Improve ride quality*
  - Lower operating costs
    - *Operational & Commercial Viability*
  - Decrease draft / wake & fully characterize performance
  - Increase high-speed performance and payload fraction
  - Explore new methods of production with composite materials
  - Create new analytic tools to validate designs
    - *Fidelity of design to build (useful CFD models)*



# National Competitive Advantage

## *Seaborne Composite Coalition*



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- ***Expand the Industrial Base for National Competitive Advantage***
  - Advance National Competitive Strategy for US shipbuilding capabilities.
  - Catalyze public – private partnerships
    - *Between Government, Industry and Academia*
    - *Team with diverse partners ... and leverage advances abroad*
  - ***to create American global competence***





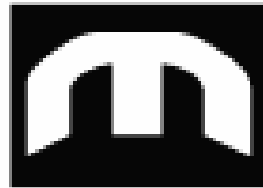
# *Stiletto* (M-Ship Co)

## *...Operational Surrogate*



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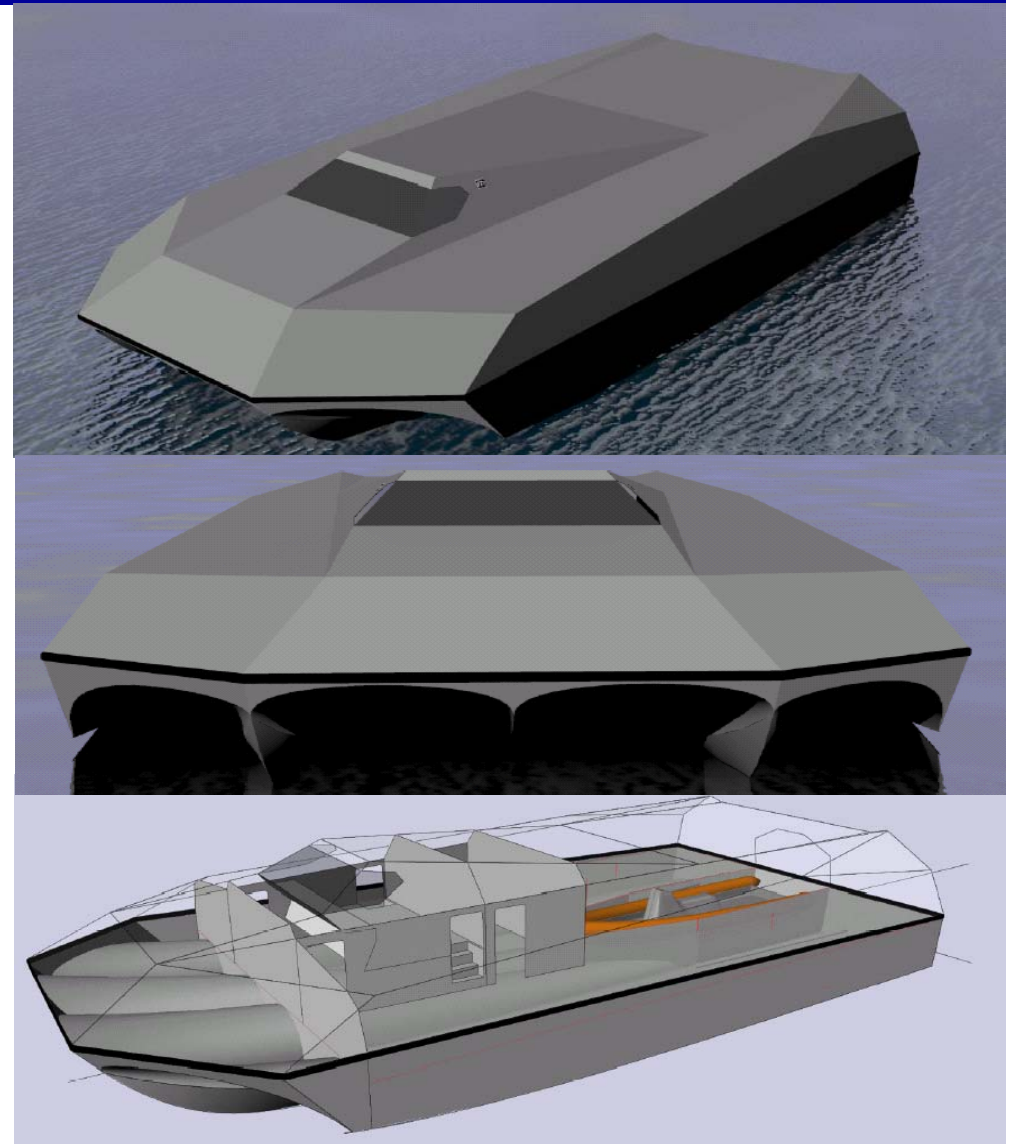
# M-80



## M SHIP

LOA	80'-0"
Beam	40'-0"
Tunnel Width (4)	5'-0"
Draft (static)	2'-4"
Displacement	67 MT
Payload	15 MT
Fuel Load	10 MT
Classification	ABS
Main Engines	4 x 1650HP C-30 Caterpillars
Surface Piercing Propellers	4
Speed	Max @ full load 50-55 knots
Range @ full load & max speed	500 NM
HP Required (total)	6200hp
Clear Height	15'-0"

Payloads	43% of Displ
11-M RIB or equivalent	
UAVs	
15 personnel	







# *Stiletto (M-Ship Co)*

*...Low Draft / Wake & Smooth Ride quality*



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# *Stiletto* (M-Ship Co)

## *...Under Construction*



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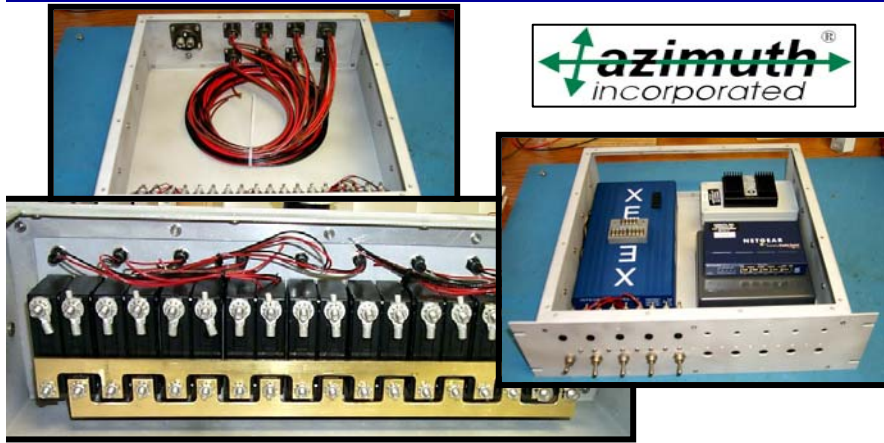


# *Electronic Keel*

## *...Rapid Reconfigurability*



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### Science & Technology

- Navigation/Charting
- Craft & Sensor Systems
- Intercom/Communications (voice and data)
- Video acquisition
- Situational Awareness
- Gigabit LAN
- Unmanned Vehicles

### Proposed Technical Approach:

Develop, install and test electronic network concept for ability to sustain C<sup>4</sup>I with multiple manned and unmanned assets acting in the littoral.

### Action to Date:

Contract documents under development.

### Cost and Schedule:

November 2004: Contract Issued

August 2005: System Installed

September 2005: Testing Complete

**Cost:** Electronic Network Design, Install, Testing: \$1.0 M

### Deliverables:

- Monthly Status Reports
- System Test Plan and System Test Report
- Drawing Package
- Operational and Maintenance Manuals
- Hardware Package
- Cost Estimate and Updates





# TacSat-1



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## Operationally Responsive Space

*TacSat-1*

## Operational Experimentation



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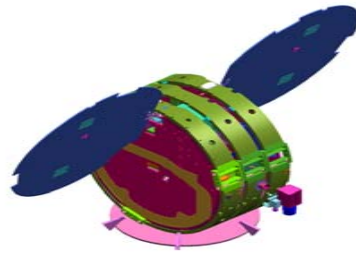
# TacSat-1 : Components



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- **MicroSatellite:**

- 120kg, 186W
- 40in dia. x 20in high
- 500km, 64° inc.
- 1 year Life



- **Payloads:**

- Cross-Platform ELINT & SEI
- Visible (70m) & IR Cameras (850m)

- **Launch Vehicle: Falcon**

- New, Privately Developed
- LOX-RP1 Rocket
- 60klb, 70ft by 5.5ft dia.
- ~1000 lb to 500km



- **Ground Station: BLOSSOM POINT MD**

- Additional Coverage from AFSCN
- Payload Tasking & Data Dissemination on the SIPRNET



- **Aircraft:**

- EP-3's: 1 Fixed & 3 Mobile RORO Units
- RJ's Expected but Number TBD



**Goal: Energize the DoD and Industry in the Tactical, Responsive Space Area**



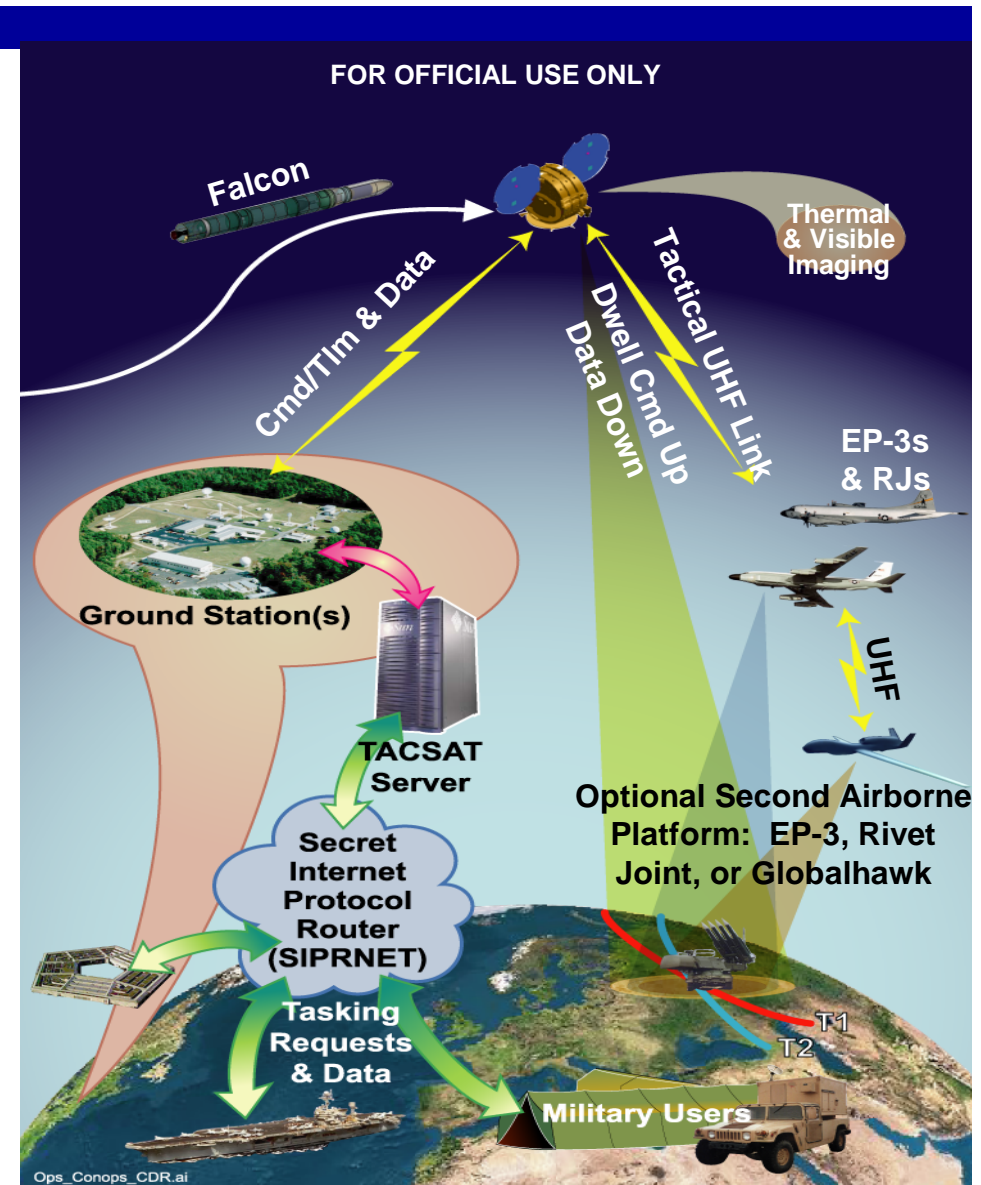


# TacSat-1 Capabilities



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- Spacecraft Stand-Alone Collects
  - Tactical / Operational users task Spacecraft for VIS / IR Imagery or RF (SEI) Tasking via the SIPRNET
- Cross-Mission
  - Aircraft & Spacecraft Coordinate Dual Collects for Geolocation
  - UAV- Spacecraft and/or Spacecraft- Ground CONOPS also Possible
- SIPRNET Gateway to Space
  - Tactical & Operational method for Tasking and / or Receiving Spacecraft Data
  - Web based Interface & access to TacSat
  - Task, Share, View & Correlate Data Collected
  - Web based Collaboration Tools for widely sharing what is learned





# Tactical Satellite Tasking and Collaboration Gateway

## Virtual Mission Operation Center (VMOC) – Stand Alone Mode



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- SIPRNET Site:

- <http://tacsat.nrl-dc.navy.smil.mil>

- User Name:
  - Password:
  - Must Register for Access
  - Account Activates in 24-48 Hrs
  - Site access exists during registration processing

- NIPRNET Site

- <http://tacsat.pxi.com>
    - demo-userif
    - vmoc-test1
    - duser
    - demouser

- FEEDBACK / User input CRITICAL for TacSat experimentation

VMOC - RF Tasking Request - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Mail Print Wordpad Links

Address [http://tacsat.pxi.com/tacsat1/genpage.php/tasking\\_request\\_rf](http://tacsat.pxi.com/tacsat1/genpage.php/tasking_request_rf) Go Links

**TacSat-1** Office of Force Transformation Department of Defense

Site Status: UI Testing MY HOME TASKING VIEW DATA SAT ADMIN INFORMATION FEEDBACK DEV-AREA

UNCLASSIFIED Currently logged in as Omar Medina LOGOFF

**RF Tasking Request**

Use this screen to request tasking of an RF observation. For assistance in making your selections please see [Tasking Tips](#). Click here to learn more [About Coverage](#). Click here to enter location in [Other Coordinates](#)

Tasking Request Name:

Satellite: TacSat-1

RF Sensor/Modes: None [Mode Definitions]

Sensor Configuration: CuF-ELINT [Sensor Configuration]

Latitude:  12.34, North is +, South is -

Longitude:  +/-123.45, East is +, West is -

Start Date Range: 10 Aug 2004 First day

End Date Range: 17 Aug 2004 Last day

Comment:

**MAKE REQUEST**

[Frequency Range](#)  
[SEI Payloads](#)  
[CuF-ELINT](#)

[Use Map Tool](#)



# VMOC View Data Page



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- Core Capabilities
  - Viewing
    - Opens Data Automatically with Appropriate Tool
  - Searching and Organizing
  - Annotating
  - Links to Other Data Sources
  - Upload & Download Capability
- Current Viewable File Types
  - Images: \*.jpg, \*.png
  - RF: \*.pdp, \*.sei
  - Other Types Downloadable
    - Images: IR Temperature Data
    - RF: AOIO Format
- Metadata
  - Sources
    - File Names
    - Associated ground Station Files
    - User Input
  - Maintained in Database for exploitation

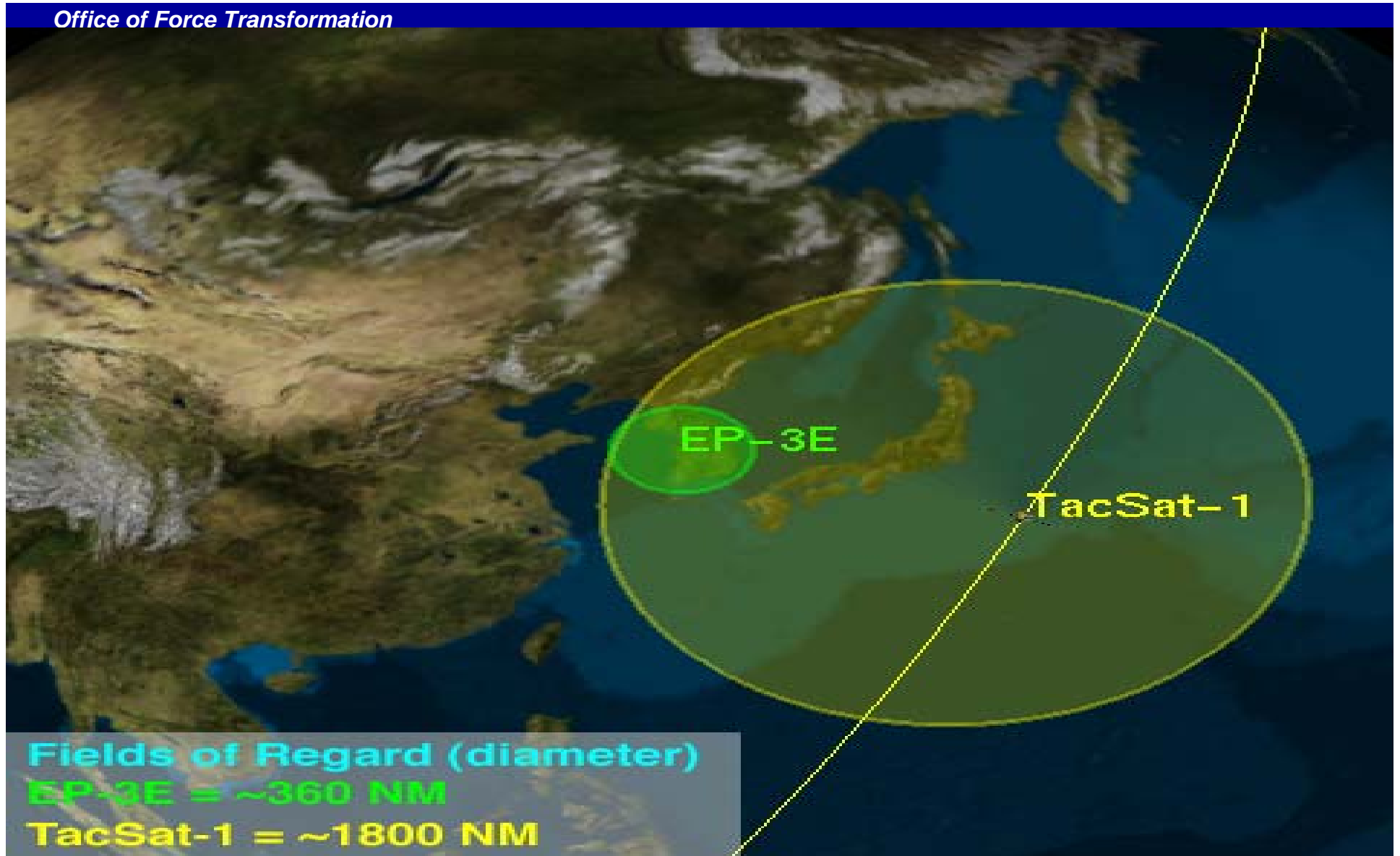




# SEI X-Mission Field of View



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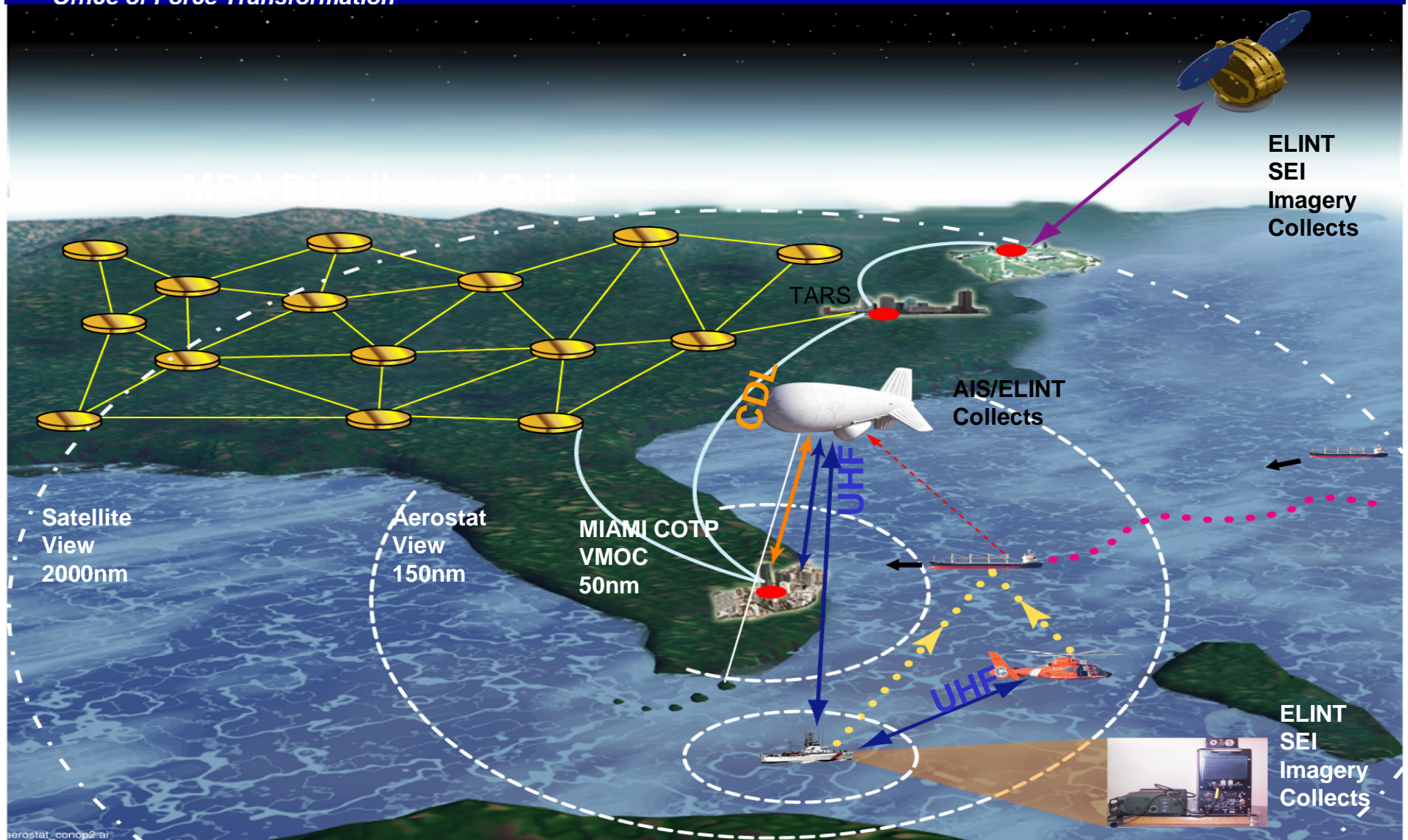




# On-Demand Satellite Tasking



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# Operational Surrogates

## *Contributions in kind*



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- **Wolf PAC Experiment**
  - *Experiment with:*
    - Assured Access to the Littorals
    - Distributed Urban Operations
  - *Serve as Local Maritime FOB*
  - *Outfit Using Existing NSW/NAVAIR/USMC C<sup>4</sup>I*
  - *Develop Collaborative Distributed C2 methods*

